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Cognitive Equivalence among Elementary School Children: An Analysis from the Age and Gender Perspectives

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Abstract

Cognitive equivalence (CE) refers to the logical explanation of similarity, is a significant aspect of cognitive development. This study assesses the influence of age and gender on the CE and its perceptible equivalence (PE) and functional equivalence (FE) dimensions. In this study, we followed a quantitative, descriptive survey approach, and observed participant's responses in a controlled situation by administering a self-developed pictorial task. Participants comprising 120 elementary school students in West Bengal, India. There were an equal number of male and female students of class I, III and V with a mean age of 6;6 8;5 and 10;65 (Years;Months) respectively. The descriptive mean analysis revealed that students' PE decreases with age, whereas FE and overall CE increase as age increases, which confirms Piaget's notions of stage specific developmental changes. Both overall and age-wise, we found female advantage in PE and male advantage in FE. The Mann-Whitney U Test result revealed no significant gender difference in PE, FE, and total CE. The study suggests for provision of a age specific and gender-neutral curriculum and pedagogical practices. Parents, teachers and education policymakers should focus on developing PE at the early stages and FE at later stages of education.

Keywords

Cognitive Development, Cognitive Equivalence, Perceptible Equivalence, Functional Equivalence, Age, Gender.

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1. Introduction

Elementary school years are the fundamental or formative years, where development in cognitive, affective and psychomotor aspects takes place among children at a speedy rate (Mohakud, 2018). Among these aspects, development in cognitive areas is most vital. Cognitive development is the process of obtaining knowledge, including perceiving, recognizing, reasoning, and judging (Bransford et al., 2000). Piaget and his associates identified different processes to illustrate cognitive development among children, i.e., adaptation, equilibration, organization, de-centration, conservation, seriation, and classification (Mishra, 2014). Among these processes, conservation is an important one, which basically appears in the concrete operational stage, which falls in the elementary school years. Conservation refers to the understanding that quantities remain constant when nothing is added or taken away from something despite changes in form, appearance, or place (Lambert & Spinath, 2017). Identity and equivalence are simply conservation, where identity conservation precedes equivalence conservation (Elkind, 1968). According to Sidman (1994), equivalence is an essential process concerned with the quantitative relationship between two objects during two successive states (Mandler 2010).

Children represent their world through enactive, iconic, and symbolic modes of representation (Bruner et al., 1966) and impose equivalence on things accordingly. In these representations, equivalence formation is based on standard rules in some action, perceptual likeness, and grammatical principles as synonyms, super-ordination, or syntactic substitutability, respectively (Bruner et al., 1966). Equivalence is the child's understanding that the equality of pairs of stimulus objects vis-a-vis these same quantitative properties is not affected by irrelevant perceptual transformations of one pair member (Elkind, 1968). A similar concept is 'Cognitive Equivalence' (CE), which is the logical explanation of similarity among different objects, things, or word meanings. It is the ability to find out similar characteristics among different objects or things (Khan & Mohakud, 2018). The similarity explanation may be from both the quantitative and qualitative perspectives (Khan & Mohakud, 2018). While explaining the modes of representation (enactive, iconic and symbolic), Bruner (1960) introduced two types of thought processes: narrative thought (temporally/causally sequential, focused on details and action) and paradigmatic thought (mental categorization by recognizing abstract, systematic similarities of unrelated phenomena) which are the foundation of this CE.

CE focuses on the logic or justification given as similarity judgment based on grouping some stimulus (i.e. words or objects). There are three important bases of grouping, i.e., superordinate, complexive, and thematic (Olver & Hornsby, 1966). Superordinate groupings consist of common features or characteristics. For example, they all are food, or they all make noise. Complexive groupings use attributes based on local rules rather than universal ones, for example, grouping bags, gloves, and cows as, "These could be leather gloves and leather bags, and we get leather from cows." Thematic groupings are formed based on how the items fit in a sentence, story, or theme. For example, the little girl ate a banana on the way to the store to buy chocolates.

Five distinct logical explanations can be imposed as similarity judgment or justification of grouping (Olver & Hornsby, 1966), known as the dimensions of equivalence. These are perceptible (structures or appearances), functional (functions or uses), affective (related to emotions), nominal (based on common names), and fiat equivalence (stating similar without giving any justification). Among these five distinct types of explanations, perceptible equivalence (PE) and functional equivalence (FE) are the most common. The ground of PE is structural perception. Its primary focus is on the external world, which is concrete. The child may determine the items equivalent based on immediate phenomenal qualities such as colour, size, shape, and position in time or space. For example, cycles, bikes, and cars are the same because they all have wheels. Further, perceptible responses are of two types- perceptible intrinsic and perceptible extrinsic. Perceptible intrinsic responses, for example, 'they all are yellow or green' (adjective). Perceptible extrinsic response, for example, 'they all are in the house' (preposition-position in time or space). On the other hand, the ground of FE is functions. Its primary focus is on the internal thought process, which is abstract. The child may draw equivalence on the uses or functions of the items, considering either what they do or what can be done to them. For example, cycles, bikes, and cars are the same because we use them for travelling.

1.1. Age, Gender and Cognitive Development

It is empirically proven that several factors influence cognitive development (Sinha & Jha, 1989), such as social, economic, educational (Mishra, 2014), social-emotional, cultural contexts (Suizzo, 2000), socioeconomic status (Bhan, 1994 cited in Mishra, 2014), schooling (Dash & Das, 1984 cited in Mishra, 2014). Likewise, age also plays a vital role in cognitive development (Dash & Das, 1984, cited in Mishra, 2014; Mishra & Padhee, 1987). A dramatic

developmental and social change occurs between six to fourteen years of age (Eccles, 1999). Cognitive growth continues with age (Joseph et al., 1982), and children of various ages have different capacities for attention and comprehension (Simatwa, 2010). Age is also a factor in the development of equivalence concepts (Nelson, 1971). Sigel (1953) and Nelson (1971) evidenced that regardless of the nature of the stimulus, perceptual bases of classification decline with age, and conceptual bases increase. Seriation and classification abilities are operationalized at 8 and 9 years of age, respectively (Gakhar & Kaur, 1990). Sigel's findings supported the hypothesis that classificatory behaviour changes with age (Sigel,1953; Nelson, 1971). Children's and adults' thinking differs in judging similarity based on the diversity of environment, learning, growth, and development (Olver & Hornsby, 1966). Older children performed better on all judgment tasks, whereas kindergarten children performed better only on identity conservation (Bush et al., 1975). Classification skills continuously improve with age, and the functional classification model was dominant in all age groups (Malhotra, 1990). Jain (1984) also pointed out that categorization skill development depends on age. Adult categorizations are more rule-based than children's (Mishra, 2014). Youngers are perceptible, older are functional in categorization, and 4^{th}, 5^{th}, and 6^{th} graders performed increasingly better in conservation tasks (Vartak, 1972).

In our society, from the very beginning, we, as parents, teachers, or peers, treat children differently according to their gender ascribed by society (Dinkel & Snyder, 2020), which forces children to develop a gender-specific role or behaviour (gender stereotypes). Cognitive factors contribute to how children think or act as males or females. Both the biological factors (such as neurological structure and functions and hormones) and the sociocultural factors (such as sexual propensities or gender stereotypes constituted by society and bio-psychological factors) account for the differences between males and females (Psaltis & Zapiti, 2016). Our curriculum and teaching methods also reflect different treatment types for males and females (Santrock, 2011; Benattabou, 2015). If learning is a learned behaviour and environment and teaching influence learning and cognition, this treatment may lead to gender differences. However, some significant empirical shreds of evidence both supported and contradicted this hypothesis. Generally, intelligence does not vary based on gender. Still, differences are found in some cognitive areas, as females showed slightly better verbal skills than their male counterparts (Blakemore, Berenbaum, & Liben, 2009). The research review of Halpern et al. (2012) revealed that boys have better visuospatial skills than girls. However, Hyde (1996) argued that this visuospatial gender difference is minimal. CE is also

significantly influenced by sex (Vartak, 1972, cited in Mishra, 2014). Contradictorily, Uzgiris (1964), Alexander (1962), and Bat-Haee (1971) revealed no significant sex differences in the conservation of mass, weight, and volume. The influence of gender stereotypes is not yet evident concerning sexual dimorphism in brain anatomy, brain function, cognition, and behaviour (Jäncke, 2018).

2. The Present Study

Though researchers explored different dimensions of cognitive development such as cultural, socioeconomic, sociocultural, socio-emotional, or other kinds of impairment, general intelligence, age, and sex, this field requires special attention and more studies. Although many researchers conducted studies abroad, only a few have done so in India, particularly in West Bengal. Rarely has any investigation been found on PE, FE and CE in the present decade. Results of those cognitive studies concerning age and gender revealed contradictions. These results struck the researcher's mind and raised the question of whether CE varies with the age and gender of elementary school students. This study is focused on this question, and aims to examine PE, FE, and CE of elementary school students based on age and gender. We hypothesized that the development of PE, FE, and CE among elementary school students does not vary with age and gender variation. Here, age is revered as biological or chronological age. In this study, the term 'gender' referred to socially ascribed or identified roles, unlike sex, which is biological.

3. Method and Procedure

3.1. Research Design

In this study, the researchers followed the quantitative, descriptive survey design and data collection was done through a task-based observation in a controlled situation.

3.3. Participants

One hundred twenty (N=120) elementary school children participated in this study. They were studying in Class I, III, and V, and their mean ages were 6;6, 8;5, and 10;65 (Years;Months), respectively. The participants were studying in Bengali medium schools under the West Bengal Board of Primary Education (WBBPE) and the West Bengal Board of Secondary Education (WBBSE). Because of the heterogeneous nature of the participants, firstly, we stratified them based on their gender, locality and class level and selected an equal proportion of male and female (60+60), 40 students from each class. After that, we

conveniently selected three schools in the Kolkata district and selected 60 participants randomly, 20 from each class, and considered them urban representatives. The other 60 rural representatives were selected accordingly from three schools in the Purba Bardhaman district. In all the cases, their participation was voluntary, and they could withdraw their participation at any point of time during the research process.

3.4. Measures

This study employed two instruments. The first one is a personal information sheet for recording participants' personal information like, name, age, gender, class and school name. The other one was a Cognitive Equivalence Measuring Pictorial Task (CEMPT), adopted from the study of Olver and Hornsby (1966), and modified by Khan and Mohakud (2018). This instrument consists of 42 pictures representing familiar objects such as a scissor, a doll, a bee, a pumpkin, carrots, various articles of clothing, a cycle, a boat, a car, and so forth, and we pinned up these with a piece of thermocol sheet in a 7/6 array. Content validity of the CEMPT was ensured with experty opinion. Based on a pitot study on the test-retest reliability coefficient was found to be .782.

3.5. Data Collection Setup and Procedure

This study observed participants' performance in a controlled situation by administering the pictorial task. Initially, we took informed consent from the heads of the concerned schools and randomly selected students as participants. After that we briefed the purpose of this study to the participants. Then we asked them to come one student at a time in a pretty different room. There was a table and two chairs where the participant and one of the researchers sat facing each other, and the table was between them. The picture array was presented on the table. The students were instructed to come forward and observe the array minutely, taking sufficient time. Each student had to identify each picture first to ensure familiarity with them. Whenever they could not identify a picture, we familiarized it. Then, the student was instructed to form groups with similar pictures by removing them from the array and putting them in a different place below the array. The participants could take as many pictures as they wanted. When they completed the grouping, we asked them to tell how the images were alike/similar. Whatever they explained, we recorded it on the response sheet. Then, the picked-up images were placed in their original position in the array. After that, they were asked to form a new group. They could take previously chosen pictures, but the grouping and the explanations must be different. Likewise, the procedure was repeated ten times. Each

participant took 25 to 35 minutes to complete the whole task. After completing the task, we gave them chocolates to appreciate their voluntary participation. While organizing the responses, we categorized the children's responses into two heads, i.e., Perceptible Equivalence (PE) and Functional Equivalence (FE). First, we counted perceptible responses where students grouped pictures based on their appearance, i.e., looking in the same shape, length, colour, or common name (viz., Fruit, vegetables, animals, cars). We counted functional responses where groups were formed based on their functions/uses (viz., Objects like knives, swords, and saws are alike because we use them to cut something, i.e., cutting purpose). We scored each logical explanation as one (1). Then, we added the scores of all ten trials separately to estimate the PE and FE scores. Finally, we summed up the PE and FE scores to calculate the total Cognitive Equivalence (TCE) score. Higher score in this measure indicated higher cognitive equivalence and vice versa.

3.6. Data Analysis Techniques

The collected responses were analyzed using qualitative and quantitative techniques and presented in two separate headings: types of responses received and statistical analysis. The assumption of data normality was checked using Skewness, Kurtosis and Kolmogrov-Smirnov test. The test results revealed that the values of Skewness and Kurtosis in PE, FE, and TCE for both class and gender were not within the range of variation considered by Curran et al. (1996) and Kline (2005). Further, the Kolmogorov-Smirnov test results [for male students in PE (p=.018), FE (p=.000), and TCE (p=.000), and female students in PE (p=.081), FE (p=.001), and TCE (p=.000)] was also significant, which rejects the assumption of data normality. When data do not meet the parametric assumptions, like data normality, non-parametric statistics are more appropriate (McKnight & Najab, 2010; Nachar, 2008). For this reason, we considered the non-parametric Mann-Whitney-U test to test our hypothesis.

4. Results

4.1. Type of Responses Received

We received different kinds of responses from our participants with similarity explanations. These are similarities based on colour, shape, size, the purpose it serves, characteristics, ability, common name, and counting. Further, they also grouped pictures but failed to provide any justification.

Table 1 Age-group-wise grouping of pictures with similarity justification

Age Group	Number of Pictures used for grouping	Examples of Grouping with Justification/ Similarity Logic	Types of Equivalence Assumption
6;6 age group (Class I)	2-3 pictures	Pumpkin, carrot, and apple: Identical in colour Cows and dogs: Both are animals	More perceptual than functional
8;5 age group (Class III)	2-4 pictures	Fish and boat: Fish lives in water, and boats float on water; Cake, candle, and knife: Used for celebrating a birthday; Socks and shoes: Are worn in winter; Lamp and candle: Both give light; Pigeon, bee, and aeroplane: Both can fly; Pumpkin, carrot, and apple: Identical in colour, and are eaten; Dog, hen, rabbit, and fish: All are animal; Notebook, pencil, and ruler: Used for writing and drawing purpose.	Both perceptual and functional
10;65 age group (Class V)	2-14 pictures	Umbrella and house: Both protect us from rain; Saw, hammer, scissor, tap: All are made of iron; Hen, Rabbit, and Pigeon: all eat germs and bees; Carrot, Pumpkin, pointed gourd: all are vegetables and eatable; Sword, scissor, nails and tap: all are sharp; Boat, cycle, and aeroplane: all are used for travel purpose; Dog, hen, rabbit, pigeon, and cow all are pets; Dog, Hen, Rabbit, Pigeon, Fish, Cow, and Bee: All are animal; Socks, sweater, shoes, pant and shirt, gloves and frock: all are apparel and are wear in winter; Pen, paper, pencil, house, school, and car: They can draw or write something on paper by pen, and pencil at home and also can go to school by car; Tree, rabbit, pigeon, candle, frock, balloons, dog, umbrella, carrot, saw, telephone, socks, shoes, sweater, hat, and clock: All can be found in houses; Knife, pointed gourd, screw, saw, scissor, money, umbrella, hammer, cycle, ruler, lamp: They need these in their daily life.	More functional than perceptual

4.2. Statistical Analysis

4.2.1. Age-wise Comparison of PE, FE, and TCE

While comparing age-wise developmental changes (see Table 2), we found that the mean score of PE was highest (6.28) among the 6;6 mean age group, and second highest (5.40)

among the 8;5 mean age group, and the score was lowest (5.15) among the 10;65 mean age group. Therefore, it indicates a clear-cut decrease in PE among the age groups. The Kruskal-Wallis-Test result revealed that the groups did not differ significantly (p=.110>.05).

On the other hand, the mean FE score was lowest (3.88) in the first mean age group, second highest (5.28) in the second mean age group, and highest (5.85) in the third mean age group. Which indicates an apparent increase of FE, and the groups differed significantly (p=.005<.05). Further, it was found that the actual difference was present between 6;6 and 8;5 age group (p=.011<.05), and 6;6 and 10;65 age group (p=.003<.05). Age group 8;5 and 10;65 did not differ significantly (p=.517>.05).

The total CE also increased and was lowest (10.15) in the first mean age group, second highest (10.68) in the second mean age group and highest (10.83) in the third mean age group. However, the Kruskal-Wallis test revealed that the groups did not differ significantly (p=.310>.05).

Table 2 Age-wise comparison of PE, FE, and CE among the participants

Mean age (Years; Months)	Perceptible Equivalence (PE)			Functional Equivalence (FE)			Total Cognitive Equivalence (TCE)		
	Mean	SD	Sig	Mean	SD	Sig	Mean	SD	Sig
6;6 (Class I)	6.28	3.18		3.88	2.58		10.15	2.45	
8;5 (Class III)	5.40	2.43	.110	5.28	2.48	.005**	10.68	1.66	.310
10;65 (Class V)	5.15	2.67		5.85	2.70		10.83	2.49	
Comparison between 6;6 and 8;5 age group			X	X		.011*	X		X
Comparison between 6;6 and 10;65 age group			X	X		.003**	X		X
Comparison between 8;5 and 10;65 age group			X	X		.517	X		X

Note: Result is statistically significant at *0.05 and **0.01 level of significance

4.2.2. Gender-wise Comparison of PE, FE, and CE

Table 3 shows that the male students with a mean age of 8;6 have a mean score and Standard Deviation (SD) in PE, FE, and total CE are 5.13 and 3.11, 5.25 and 2.80, and 10.38 and 2.40. In the case of sixty (60) females with the same mean age of 8, 6 had a mean score, and SD in PE, FE, and CE was 6.05 and 2.61, 4.63 and 2.55, and 10.68 and 2.10, respectively. It indicates that female (6.05) students' logical explanations were more perceptible than males (5.13), but the groups did not differ significantly (p=.134>0.05).

In the case of FE, male students (5.25) were more functional than females (4.63), but their performances did not differ significantly (p=.236>0.05).

Moreover, in the case of total CE, females (10.68) scored higher than males (10.38), but they did not differ significantly (p=.481>0.05). Therefore, it indicates no gender differences in PE, FE, and total CE.

Further, we also compared the gender categories in each class. The mean age of twenty males and twenty females studying in Class-I was the same (i.e., 6;5 See Table). The same table also shows that female students' logical explanations (7.00) were more perceptible than males (5.55), but the groups did not differ significantly (p=.167>0.05). Nevertheless, in the case of FE, male students' logical explanations (4.40) were higher than their female counterparts (3.35), and their performances were statistically not significant (p=.210>0.05).

Furthermore, again, in the case of total CE, females (10.35) scored higher than males (9.95), but they did not differ significantly (p=.668>0.05). So it means no gender difference is present in PE, FE, and total CE in Class I.

The mean age for twenty males and twenty females (studying in Class III) is 8;6 and 8;7 (See table-3). The same table also shows that female students' logical explanations (5.60) were more perceptible than males (5.20), but the groups did not differ significantly (p=.563>0.05).

In the case of FE, male students' logical explanations (5.50) were more functional than females (5.05), however, the differences in their their performances were statistically not significant (p=.508>0.05).

In total CE, males (10.70) scored higher than females (10.65), but they did not differ significantly (p=.876>0.05). So, it indicates that no gender differences in PE, FE, and total CE are present in Class III.

In Class V, the mean age for twenty males and twenty females are 10;6, and 10;7, respectively (See table-3). The same table also shows that (in Class-V), female students' logical explanations (5.35) were more perceptible than males (4.95), but the groups did not differ significantly (p=.661>0.05). In the case of FE, male students' logical explanations (5.85) were higher than their female counterparts (5.50), and their performances were statistically not significant (p=.859>0.05).

Moreover, again, in the case of total CE, females (10.85) scored higher than males (10.80), but they did not differ significantly (p=.956>0.05). It reveals that no gender differeces in PE, FE, and total CE are present in Class V. The performance of males in CE was better only in Class III. In the other two classes, females scored higher than males.

Table 3 Gender-wise comparison of PE, FE, and CE

Class	Gender category	Mean age (Years; Months)	Perceptible Equivalence (PE)			Functional Equivalence (FE)			Total Cognitive Equivalence (TCE)		
			Mean	SD	Sig	Mean	SD	Sig	Mean	SD	Sig
Total	Male-60	8;6	5.13	3.11	.134	5.25	2.80	.236	10.38	2.40	.481
	Female-60	8;6	6.05	2.61		4.63	2.55		10.68	2.10	
Class-I	Male-20	6;5	5.55	3.36	.167	4.40	2.58	.210	9.95	2.78	.668
	Female-20	6;5	7.00	3.88		3.35	2.54		10.35	2.11	
Class III	Male-20	8;6	5.20	2.14	.563	5.50	2.82	.508	10.70	1.17	.876
	Female-20	8;7	5.60	2.72		5.05	2.14		10.65	2.06	
Class V	Male-20	10;6	4.95	3.49	.661	5.85	2.91	.859	10.80	2.95	.956
	Female-20	10;7	5.35	1.53		5.50	2.54		10.85	2.00	

Note: SD: Standard Deviation, M-W-U: Mann-Whitney-U test statistics, Sig: Significance level for the two-tailed test

4.2.3. Discussion

The results of this study revealed an age-wise decrease in PE and an increase in FE, which is similar to the findings of Olver and Hornsby (1966), Nelson (1971), Khan and Mohakud (2018), and Bera (2018). This finding confirms that children give more importance to the visual or structural aspects at a young age, and gradually, their logical explanation shifts towards functionality. This means children first learn to identify an object based on its perceived characteristics/appearances. Further, this identity helps children in reasoning, which further helps in equivalence formation. This knowledge of the age-wise change in cognitive functioning is vital for designing instructions for children. Simatwa (2010) has given much importance to this aspect and suggested that the curriculum and instructional manager should be diversified to give importance to the needs and interests of learners of varying ages and abilities in the school. Curriculum objectives of different levels must reflect the different stages of the learner's growth. The subject matter's scope, sequencing, and integration must relate to the learner's cognitive growth. The teaching methodology, materials, and learning activities should be appropriate to each of the cognitive developmental stages of the learners. Teachers should use the hierarchy to understand children's reasons for thinking and doing and to help them master intellectual processes at the appropriate age.

Among all the elementary school students and in each age group, female students' logical explanations were more perceptible, and male students' logical explanations were more functional. That means females gave importance primarily to structures or appearances, but the male students prioritized functional viewpoints rather than structures or appearances. This

result corroborates the results of Olver and Hornsby (1966), Khan and Mohakud (2018), and Samanta (2018). In the case of total CE, female students scored higher than their male counterpart among overall students and in Class I and Class V. In Class III, male students scored higher than their counterparts. However, male and female students did not differ significantly in all the classes. Similar to this finding, some other studies reported no gender differences in cognitive performance (Arifuddin et al., 2013; Haghighi, Ghanavati & Rahimic, 2015). However, there are gender differences in other areas of cognitive functioning (Palejwala & Fine, 2015; Wang & Ting, 2018; Dodig et al., 2020; Bar-Tal & Jarymowicz, 2010; Psaltis & Zapiti, 2016; Zarantonello et al., 2020; Hausmann, 2020; Xu et al., 2019; Spets & Slotnick, 2020; Mierdel & Bogner, 2019; Golsteyn & Schils, 2014; Cuoco et al., 2020). However, except for Khan and Mohakud (2018) and Samanta (2018), no such finding is present in support or contradiction in the case of cognitive equivalence. Therefore, it is a new insight for further researchers.

5. Conclusion

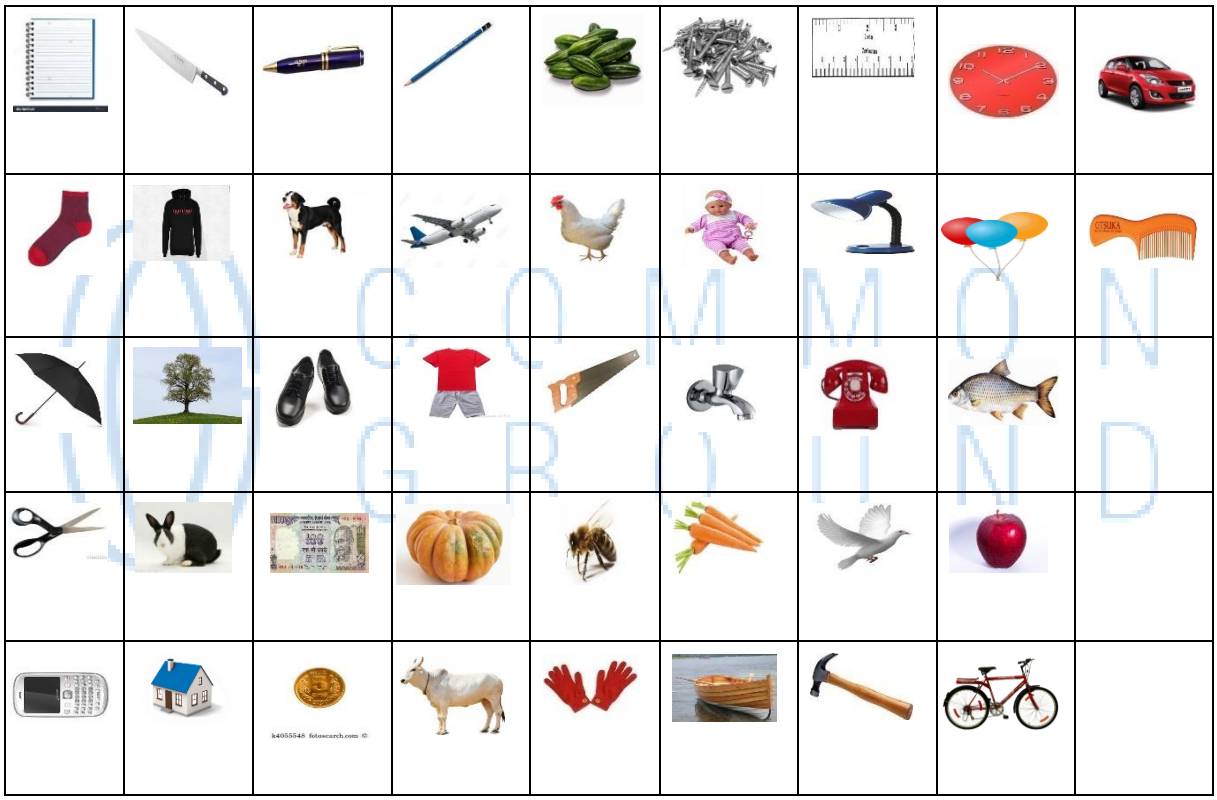
This study intended to measure the variations in perceptible, functional and cognitive equivalence among elementary school students concerning age and gender. Concerning age, the findings revealed that perceptible equivalence decreases and functional equivalence increases with age. This means that children give importance to perceptible aspects at a young age, and older children give more importance to functional aspects for similarity justification. Age-wise significant difference is present only in functional equivalence. This finding confirms the age-wise developmental shifts as proposed by Piaget. Therefore, while designing the curriculum, coloured pictures, symbols, charts and diagrams must be included in the curriculum and textbooks of lower classes and introduce abstract concepts in later stages. Curricular load should also be given accordingly, which is already practised in our country. We need to formulate an organized curricular framework for specific indications regarding primers and age/class-appropriate textbooks. Side by side as teachers or parents, we need to emphasize functionality in teaching our female children.

The gender issue is an essential aspect of education. Though previous researchers reported gender differences in some areas of cognitive functioning, this study revealed no gender differences in any aspect of cognitive equivalence. So, we must remember this while framing curricula or writing textbooks. Therefore, there should be no gender biases in the school curriculum, syllabus, textbooks, and teaching-learning methods. For this purpose,

educational-policy framers must focus on this aspect. Furthermore, equal importance must be given to treating children of each gender at home. The present study's findings were purely task-based observations of a small sample in a controlled situation, not genuinely based on experimentation. There is also an insufficient number of studies in the field. The concept of gender connotes different meanings in different cultures. Therefore, it is not easy to generalize the study findings. Despite these limitations, this finding in the cognitive aspect opens up a new dimension of research for future researchers.

Appendix

The picture tray presented before the participants



Note: Source: Khan and Mohakud (2018).

Submission Declaration and Verification

The manuscript is original and based on 1st hand data, and not copied from anywhere else. No part of this manuscript has been published before, nor is any part of it under consideration for publication at any other journal or anywhere else.

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Declaration of Interests

None

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